Seismic Tomography Mathematical Problems

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The basic mathematical problems of seismic tomography are reduced to the solution of the first kind operator equations. To find their approximate solution we use Radon's transformation.

The construction of a wave type seismic tomograph is offered. The sensor element is the sphere, filled with a liquid, combined with a waves catching optoelectronic system . The process in a sensor element is described by Helmholz wave equation. The solution of an inverse problem of the mentioned equation is given. The Helmholz equation is reduced by a known ratio to the Shroedinger equation. The found solution allows to determine the structure of seismic tomograph construction.

The final solution of tomograph construction problem there is not yet found. Therefore one of ways of overcoming of complexity of tomography theory and practice is the use of integrals and derivatives of the fractional order. The research of the Helmholz equation as ordinary differential equation of the fractional order is given.

Coshy and Dirichlet's problems for the differential equations of the fractional order are solved. In the first case the solution has the form of special functions a type of Mittag-Leflaire and in second – uniquely solved the second kind Fredholm equation.

In case of the linear differential equation of the fractional order with constant factors the solution is found in space of the generalized functions. All this allows to construct the seismic tomograph on the basis of the Fractal Theory.